

Notice of Allowability

Application No.

09/625,578

Examiner

Kandasamy Thangavelu

Applicant(s)

SMITH ET AL.

Art Unit

2123

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to November 17, 2004.
2. ☒ The allowed claim(s) is/are 1,2,4-26 and 28-36.
3. ☒ The drawings filed on 25 July 2000 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

KEVIN J. TESKA
SUPERVISORY
PATENT EXAMINER

DETAILED ACTION

Introduction

1. This communication is in response to the Applicants' communication dated November 17, 2004. Claims 1-36 of the application are pending.

Drawings

2. The drawings submitted on 25 July 2000 are accepted.

Examiner's Amendment

3. Authorization for this examiner's amendment was given in a telephone conversation by Mr. Erik Heter on March 30, 2005.

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

4. In the Claims:

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In Claim 1, Lines 10-12, “simulate a voltage regulator circuit using a mathematical model of said voltage regulator circuit, wherein simulating said voltage regulator circuit includes:”

has been changed to

-- simulate the operation of said power distribution system, wherein said power distribution system includes a voltage regulator circuit coupled to a load, and wherein said simulation comprises:

simulating a voltage regulator circuit using a mathematical model of said voltage regulator circuit, wherein simulating said voltage regulator circuit includes:--.

In Claim 1, Lines 18-20, “select one or more different decoupling components based on said known system parameters for said power distribution system and entries in said database;”

has been changed to

-- obtain an estimate of a bulk capacitance value for said power distribution system;
perform a cyclical simulation of said power distribution system, wherein said cyclical simulation comprises simulating the operation of said power distribution system over a plurality of clock cycles;

refine said bulk capacitance value based on results obtained during said cyclical simulation;

select one or more different decoupling components based on said bulk capacitance obtained during said simulating the operation of said power distribution system and said known system parameters for said power distribution system and entries in said database;--.

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In Claim 3:

Cancel claim 3.

In Claim 4, Line 1, "The system as recited in claim 3"

has been changed to

-- The system as recited in claim 1--.

In Claim 6, Line 1, "The system as recited in claim 3"

has been changed to

-- The system as recited in claim 1--.

In Claim 8, Line 1, "The system as recited in claim 3"

has been changed to

-- The system as recited in claim 1--.

In Claim 9, Line 1, "The system as recited in claim 3"

has been changed to

-- The system as recited in claim 1--.

In Claim 11, Line 1, "The system as recited in claim 3"

has been changed to

-- The system as recited in claim 1--.

In Claim 12, Line 1, “The system as recited in claim 3”

has been changed to

-- The system as recited in claim 1--.

In Claim 13, Lines 10-11, “simulating the operation of said voltage regulator circuit using a model of said voltage regulator circuit;”

has been changed to

-- simulating the operation of said voltage regulator circuit using a model of said voltage regulator circuit, wherein simulating said voltage regulator circuit includes:

simulating a voltage with a voltage source model;

simulating ramping up or ramping down of current in said voltage regulator circuit with a model of a slew inductor; and

simulating effects of output inductance on said voltage regulator circuit with a model of an output inductor;--.

In Claim 25, Lines 10-12, “simulate a voltage regulator circuit using a SPICE model of said voltage regulator circuit wherein simulating said voltage regulator circuit includes:”

has been changed to

-- simulate the operation of said power distribution system, wherein said power distribution system includes a voltage regulator circuit coupled to a load, and wherein said simulation comprises:

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simulating a voltage regulator circuit using a SPICE model of said voltage regulator circuit, wherein simulating said voltage regulator circuit includes:--.

In Claim 25, Lines 19-21, “select one or more different decoupling components based on said known system parameters for said power distribution system and entries in said database;”

has been changed to

-- obtain an estimate of a bulk capacitance value for said power distribution system;
perform a cyclical simulation of said power distribution system, wherein said cyclical simulation comprises simulating the operation of said power distribution system over a plurality of clock cycles;

refine said bulk capacitance value based on results obtained during said cyclical simulation;

select one or more different decoupling components based on said bulk capacitance obtained during said simulating the operation of said power distribution system and said known system parameters for said power distribution system and entries in said database;--.

In Claim 27:

Cancel claim 27.

In Claim 28, Line 1, “The system as recited in claim 27”

has been changed to

-- The system as recited in claim 25--.

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In Claim 30, Line 1, "The system as recited in claim 27"
has been changed to
-- The system as recited in claim 25--.

In Claim 32, Line 1, "The system as recited in claim 27"
has been changed to
-- The system as recited in claim 25--.

In Claim 33, Line 1, "The system as recited in claim 27"
has been changed to
-- The system as recited in claim 25--.

In Claim 35, Line 1, "The system as recited in claim 27"
has been changed to
-- The system as recited in claim 25--.

In Claim 36, Line 1, "The system as recited in claim 27"
has been changed to
-- The system as recited in claim 25--.

Reasons for Allowance

5. Claims 1-2, 4- 26, 28-36 of the application are allowed over prior art of record.

6. The following is an Examiner's statement of reasons for the indication of allowable subject matter:

The closest prior art of record shows:

(1) on-chip power bus modeling and switching noise analysis to optimize placement of on-chip decoupling capacitors for high performance circuit design; an equivalent circuit consisting of time varying resistors, loading capacitors and decoupling capacitors is used to simulate the switching activities of the functional blocks; based on the noise analysis results , a decoupling capacitor insertion algorithms is proposed to determine the amount of decoupling capacitance needed to keep the power supply voltage within specification and optimize the size and location of the on-chip decoupling capacitors; the optimization of on-chip decoupling capacitors involves an iterative process between circuit simulation and floor planning; the added decoupling capacitors are modeled with proper time constants and simulated with the new floor plan until the change in voltage is contained (**Chen et al.**, "On-chip decoupling capacitor optimization for high-performance VLSI design", IBM Research Division, June 1995);

(2) a microcontroller with a voltage regulator to keep the voltage within a narrow range; the device comprises a semiconductor circuit and a voltage regulator which can be electrically switched on and off; the semiconductor circuit, in a specific operating state, outputs to the voltage regulator a signal which causes it to switch off thus switching off the supply current

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generated by the device; the voltage regulator is capable of a plurality of operating modes and can be operated as a linear regulator and as a switched mode regulator (**Hanf et al**, U.S. Patent 6,438,462);

(3) an improved power distribution system for the transmitting modules of phase array radar system; the system comprises a plurality of subassembly connectors and a plurality of small energy storage capacitors; each of the small capacitors has adequate capacity and adequately low series resistance to provide peak power required by the associated subassembly; peak power is provided while maintaining the voltage at the subassembly power connector within predetermined difference; the system further comprises a second plurality of large energy storage capacitors; the total energy storage capacity is large enough and the series resistance small enough to provide peak power required by the subassemblies for a second longer period; the voltage versus time performance of the power distribution network is simulated on a computer using simplified equivalent circuit representation (**Peil**, U.S. Patent 4,806,937); and

(4) an efficient single-switch voltage regulator which provides fast regulation at the output voltage; the regulator has a bulky capacitor on the input side; the output voltage is in series with rectified ac mains; the mathematical model of the regulator is developed using a sliding mode controller; the regulator is simulated using ac main voltage as input; the output voltage, the bulky capacitor voltage and the ac mains current are presented; the simulation results are compared against the experimental results and found to confirm the fastness of the behavior of the system (**Vazquez et al**, "An efficient single switch voltage regulator", IEEE, June 2000).

6.1 Applicants' first set of claims consists of Claims 1-2 and 4-12.

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Independent Claim 1 is directed to a system for determining decoupling components for a power distribution system, said power distribution system including a voltage regulator module.

The claim identifies the uniquely distinct features of:

“simulating ramping up or ramping down of current in said voltage regulator circuit with a model of a slew inductor;

refine said bulk capacitance value based on results obtained during said cyclical simulation;” and

“select one or more different decoupling components based on said bulk capacitance obtained during said simulating the operation of said power distribution system and said known system parameters for said power distribution system”.

Because the closest prior art fails to teach or fairly suggest simulating ramping up or ramping down of current in said voltage regulator circuit with a model of a slew inductor;

refine said bulk capacitance value based on results obtained during said cyclical simulation; and

selecting one or more different decoupling components based on said bulk capacitance obtained during said simulating the operation of said power distribution system and said known system parameters for said power distribution system, as claimed by the Applicants, Claims 1-2 and 4-12 are deemed novel and allowable.

6.2 Applicants’ second set of claims consists of Claims 13-24.

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Independent Claim 13 is directed to a method for determining a specific quantity and physical location of decoupling components within a power distribution system. The claim identifies the uniquely distinct features of:

“simulating ramping up or ramping down of current in said voltage regulator circuit with a model of a slew inductor;”,

“refining said bulk capacitance value based on results obtained during said cyclical simulation;” and

“selecting one or more of said different decoupling components based on said bulk capacitance obtained during said simulating the operation of said power distribution system and one or more electrical characteristic values for each of said decoupling components”.

Because the closest prior art fails to teach or fairly suggest simulating ramping up or ramping down of current in said voltage regulator circuit with a model of a slew inductor;

refining said bulk capacitance value based on results obtained during said cyclical simulation; and

selecting one or more of said different decoupling components based on said bulk capacitance obtained during said simulating the operation of said power distribution system and one or more electrical characteristic values for each of said decoupling components, as claimed by the Applicants, Claims 13-24 are deemed novel and allowable.

6.3 Applicants' third set of claims consists of Claims 25-26 and 28-36.

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Independent Claim 25 is directed to a system for determining decoupling components for a power distribution system, said power distribution system including a voltage regulator module. The claim identifies the uniquely distinct features of:

“simulating ramping up or ramping down of current in said voltage regulator circuit with a SPICE model of a slew inductor;”,

“refine said bulk capacitance value based on results obtained during said cyclical simulation;” and

“select one or more different decoupling components based on said bulk capacitance obtained during said simulating the operation of said power distribution system and said known system parameters for said power distribution system and entries in said database;”.

Because the closest prior art fails to teach or fairly suggest simulating ramping up or ramping down of current in said voltage regulator circuit with a SPICE model of a slew inductor;

refine said bulk capacitance value based on results obtained during said cyclical simulation; and

selecting one or more different decoupling components based on said bulk capacitance obtained during said simulating the operation of said power distribution system and said known system parameters for said power distribution system and entries in said database, as claimed by the Applicants, Claims 25-26 and 28-36 are deemed novel and allowable.

7. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue

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fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Kandasamy Thangavelu whose telephone number is 571-272-3717. The examiner can normally be reached on Monday through Friday from 8:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kevin Teska, can be reached on 571-272-3716. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to TC 2100 Group receptionist: 571-272-2100.

K. Thangavelu
Art Unit 2123
April 1, 2005



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